IS IT POSSIBLE TO TRANSFER AN INFORMATION WITH THE VELOCITIES EXCEEDING SPEED OF LIGHT IN EMPTY SPACE?

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abstract:On the base of the theory of time and space with the fractional dimensions a possibility for information transferring with any velocities is demonstrated.

01.30.Tt.05.45, 64. 60.A; 00.89.98.02.90. + p

1 Introduction

In the theory of special relativity (SR) the maximal velocity of any signal does not exceed speed of light in the empty space (the existence of optical taxions does not break SR) In the frame of multifractal theory of time and space [1] it is possible to construct the theory of almost inertial systems [2]. In this theory an arbitrary velocities of moving particles are possible if the approximate independence of speed of light from the velocity of the light source and the approximate constancy of speed of light in vacuum are valid (the breaking the low of constancy speed of light are less than possibility of modern experiment and consist $\sim 10_{-10}c$, see [1]). Is the transfer of the information within the framework of the theory [2]-[4] possible with any velocities? The difficulty of create a signal carrier of the information spreading with arbitrary large (practically infinitely large) velocity is not the main difficulty at the answer to this question. These signals can be, for example, a beams of charged particles (protons, ionized atoms) accelerated up to velocities greater then the speed of light (their energy must be more then energy $E_0 10^3$ where $E_0{=}m_o c^2$) and then spontaneously accelerated at almost infinite quantity velocity. These beams may be the carriers of the transferring information. The difficulty consists in the creating the receivers (detectors) of the information recorded by beams (or single) faster than light particles. According to the theory [2]-[4] a particle with velocity $v > c$ is spontaneously accelerated up to the velocity $v = \infty$ and practically ceases to interact with a surrounding medium. The purpose of this paper is the attempt to analyze some opportunities of detection of such particles. If the problem of detectors for registration of the faster than light particles will be decided, the problem of practically instantaneous transfer of the information at any distances is solved positively.

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2 What physical effects are existing for detection of particles moving with velocity $v > c$?

Let us suppose validity of the laws of the electrodynamics for the velocities $v > c$. After replacing $\beta = \sqrt{1 - v^2/c^2}$ by $\beta^* = \sqrt[4]{(1 - v^2/c^2)^2 + 4a^2}$, (see designations a in [2]-[4]) the Lorentz's transformation also may be used. In that case for the moving electrical charged particle possessing velocity $v \simeq \infty$ and energy $E = \sqrt{2}E_0$, near to the device playing role of the detector, there are following effects can be probably used for detection of the fact of transit of a particle:

a) In the real physical world any of the physical quantities can not be equal infinity, so we shall introduce for designation of maximal velocity of a particle designation v_m (v_m is the velocity of a faster than light particle for which the energy loss accompanying by increase of velocity is compensated by magnification of the energy gained from a medium in which the beam of the particles flow by, i.e. the velocity of a particle becomes practically stationary value, for example be in thermodynamic equilibrium with the relic radiation that gives the particle the velocity $v_m \sim 500c$). There are an almost instantaneous impulses of electrical and magnetic fields from an electrical current formed by transit of the faster than light particle through the media. These impulses could be discovered by detectors that are capable to detect super short impulses electrical or magnetic fields;

b)The kinetic energy of a faster than light particle at $v > c$ looks like $E_k \approx \sqrt{2}E_0c^2/v_m^2$. The transfer of parts of this energy basically can be registered by high precision detector's (counters of prompt particles for example based on use of an inner photoelectric effect) in case when a faster than light particle has the collision at a proton, nuclear or electron;

c) In the lengthy detector filled by substances with large density (small free length of collisions for particles) will arise the multiple collisions of faster than light particles with atoms. It can gives energy transition from substances to a faster than light particle and by that to decreasing of its velocity. The power transmission from medium to a particle will gives in decreasing of temperature of medium and besides gives the radiation of Cherenkov-Vavilov type (in an region of frequencies defined by number of collisions with atoms of the substance of the detector);

d) When the faster than light particle fly through the substance with many energy levels with negative temperatures as result may be lost of energy of substance without radiation and decreasing of negative temperature of active optical substance. Physical laws do not forbid all numbered methods of detection for ordinary particles with faster than light velocities and their experimental realization (as well as many other method's are based on an energy exchange of a faster than light particle with energy of medium) are possible. The numbered methods realization depends on the value of maximal velocity v_m .

3 Are the particles with $v > c$ and real mass exist in nature?

Let us put the question: are the faster than light particles exist in our world? When and where such particles can be discovered? As the one of consequences of the theory of fractal time (see [1]), the particles with velocities exceeding the velocity of light must have an energy exceeding their the rest energy E_o in 10^3 times. Such particles may be borne for example by explosions of stars (in that case it is possible to expect the appearance of the maximum in the spectrum of γ- quanta for the energies $E_0 10^3$ or at the first moments of "big bang" when temperatures of the early Universe exceed $10^{16}K$. If a neutrinos have the rest mass and its rest energy are small

and have the order (or less) $1ev$. the neutrinos with faster then light velocities may be produced by stars, by nuclei explosions and in the reactions of thermonuclear controlled syntheses. May some super civilization use the faster then light particles, if this civilization has the technology of receiving the beams of such particle, for record and translating information with the faster than light velocities ? In that case it is necessary to seek such particles by mentioned above (or similar) methods.

4 Conclusion

On the basis of the above-stated treatment of possibilities of detection of the particles with the faster than light speed, it is possible to make a deduction: the prohibitions for transfer and receiving of the information with faster than light speed are absent (if the theory [1]-[4] are valid). The question about an existence of the ordinary particles (protons, electrons, neutrinos) with velocities faster than light and the real mass in nature (that question was presented (and decided) for the first time in the paper [2] as one of the consequences of the theory of almost inertial systems that lays beyond of the special relativity and coincides with SR in the case of ideal inertial systems) is now unsolved. The search of taxions continue more than thirty years. I don't mention about the optical taxions. The existence of the optical taxions do not contradict the SR and apparently they are discovered. I think that only careful experimental search of the ordinary particles with the real mass (the faster than light particles) and experiments that may examine the fractal theory of time [1] may throw light on this very interesting problem.

We suggest to carry out the experiments for receiving by accelerating the protons with energies equal $\sim 10^{12}ev$. (that gives a protons the velocity equal the speed of light if the theory [1]-[2] are valid) , then to verify the predictions of the theory that presented in this paper and papers [2]-[4]

References

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